A COMMUNITY-BASED OCCUPATIONAL NEEDS ASSESSMENT MODEL FOR COMMUNITY COLLEGE PLANNING

By

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An occupational needs assessment model for community college planning was developed in this study, for the purpose of providing appropriate occupational programs and enrolling appropriate numbers of students in those programs to meet the unique needs of the communities involved.

More specifically, COMmunity-based Occupational Needs Assessment Model for Educational planning (COMONAME) was built, validated, and examples for use shown. This model

may be used by state level planners and by community college administrators in solving the following three specific problem areas:

1. identification of manpower needs in selected occupations for which input data are provided
2. providing data for minimizing the gap between the numbers of students entering selected occupational programs at the community college and the actual numbers of students that should be trained in that specific area
3. making projections of manpower needs for student enrollment planning.

Sixty-eight community colleges in Florida, Virginia, and Maryland were used in the data analysis, and at these institutions the four occupational programs chosen were secretarial science, business administration, data processing, and nursing. Community data for the predictor variables were obtained from U.S. Census Statistical Abstracts, 1974, 1975 and from these data predictors were examined and chosen for each of the four occupational areas. Predictor data were collected by county and summed to comply to the geographical service areas of the community colleges. The predictors considered for each program were as follows:

Nursing Programs

Birth Rate per 1000
Number of physicians, dentists
Number of hospital beds
Number of mental hospital admissions

Secretarial Science Programs

Number of physicians, dentists, lawyers
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Business Administration Programs

Population in 1000's (1974)
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Data Processing Programs

Number of selected service employees
Number of wholesale and retail employees
Number of manufacturing employees
Number of construction employees

The predictors were related to enrollment by use of multiple regression. For each of the occupational areas a general model was built using the three states' data for 1973-1974. The multiple R's ranged from .70 to .86 and all were significant beyond the .01 level. These models were validated by using new data (1974-1975 for Florida community colleges). Actual and predicted enrollment by program and institution in Florida were compared by computing the percentage differences. The means of these percentage differences were quite small, ranging from .94% to 16.97%, thus clearly establishing the usefulness of the COMONAME model for program planning. However, additional research is needed to expand the set of equations to include additional programs offered at community colleges.

CHAPTER I

INTRODUCTION

The identification of educational needs has become a focal point in community and educational conferences, and legislatures and state departments have begun to state strongly a concern for immediate efforts in educational needs assessment. Since the trend of severe budgetary restrictions for education has continued, educational needs assessment studies have proven of great value in the identification of the needs of both students, and business and industry, and, in the ways that the educational institutions can most efficiently and effectively meet those needs. As of 1973, twenty-seven states had passed legislation to fund various types of educational needs assessment projects (Hawthorne, 1973, p. vi).

Indeed, it has been emphasized that the capability to perform accurate educational needs assessment is critical to the future of the effectiveness of education at all levels in the United States. Discussions in U.S. Congressional committees have concluded that the greatest need in the school systems of the nation is to begin the responsible open measurement of how well the education process is actually working..."in hope of being able to improve performance of the lagging groups" (Education Commission of the States, 1972, p. 1).

Pressure from state legislatures for true accountability at public educational institutions has mandated many educational needs assessment studies. Sweigert (1968) stated that "data from a study of a community's educational needs should enable a legally responsible policy-making body to establish priorities among needs, thereby finally giving direction to educational planning" (p. 12). Furthermore, institutions seeking federal monies for categorical or other broad types of aid are expected to document thoroughly the basis for the request, and the results of a preliminary needs assessment are often required to point out specific educational needs within a community.

In Florida, the Department of Education clearly stated its commitment to a program of statewide educational needs assessment:

> The effort to secure clear goals and objectives is supported at the state level by needs assessment activities designed to identify broadly those goals which education should pursue and to collect information for assigning priorities. Such educational needs assessment activities encompass general education, occupational education, and professional education. (1972, p. 5)

Both the interest and funding for occupational programs have dramatically risen in the 1970's with the federal government's commitment to "career education" at the post-secondary level. It is probable that in the near future, the community college (and the area vocational center) will continue to develop more and more occupational programs of two years or less designed to prepare students for immediate employment on completion of the program (Thornton, 1972, p. 70).

A problem of widespread concern, though, in higher education is that of providing appropriate occupational programs and enrolling appropriate numbers of students in those programs to meet the unique needs of the communities involved. Indeed, the community college curricula must reflect local or community needs (Maxon & Sistrunk, 1973, p. 130). There is a definite need for the development of a set of conceptualizations which can enable educators to have a frame of reference to plan for and predict occupational program enrollments.

Throughout history, theories for classifying, explaining, and/or predicting events have taken many forms. Brief mathematical equations or models such as Einstein's theory of relativity ($E=mc^2$) and Miller's extensive list of verbal propositions on system's theory for the behavioral scientist are just two such widely recognized examples (Morphet, Johns & Reller, 1967, p. 71).

The effort to represent a theory in the form of a mathematical model has many advantages. It forces the theorist to make explicit how his variables are to be defined, and it forces him to state the relationship between variables (the functions relating one to another) more specifically than theories stated in verbal form. Above all, in the case of complicated theories, employing a mathematical model enables the theorist to make deductions, especially new and unsuspected ones, that reasoning in ordinary language would be incapable of attaining (Homans, 1964, pp. 973-975).

The language of differential and algebraic equations for mathematical prediction models has served both theory and research in the sciences which are built upon continuous variables, and has helped to bring theory and research together by leading them to speak the same language (Coleman, 1964, p. 100). In sociology, Goodman (1959) presented methods for using ecological data in regression analysis for making inferences and predicting individual behavior (p. 52). The McCann-Erickson index of general buying power was one of many mathematically based theories in business and used multiple regression analysis to predict sales in specific geographic areas based on a multiple of variables (Croxton & Cowden, 1934, pp. 388-389). More recently, Charvat (1964) presented a similar model for marketing management eliminating the uncertainty of assigning unspecified quotas to marketing areas for soft drink sales (p. 146).

The use of mathematically based models for predicting events is also not new to the field of educational administration. For many years, college admissions officers have been using combinations of scores from various standardized tests, high school class rank, high school grades, and other variables to predict students' success in college (Guilford, 1956, pp. 392-396). Oftentimes, the models used take the form of a multiple regression analysis.

This study, which is directed to educational planners, may be viewed as a theory put forth composed of a series of mathematical equations. This theory stipulates that there is an empirical relationship between selected community-based, quantified data and appropriate enrollment figures in selected occupational programs offered at community colleges. With this relationship established, appropriate occupational program enrollment figures for future years can be predicted, figures based on valid data rather than on supposition. The model strives to effect positive changes in post-secondary education. If these changes do indeed occur, the needs of the community will be better served.

The Research Objectives

The focus of this study was to develop a theoretical construct (model) whereby student enrollment in various occupational programs in community colleges could be related to business and industry personnel needs in given communities.

More specifically, COMmunity-based Occupational Needs Assessment Model for Educational planning (COMONAME) was built, validated and examples for use shown. This model may be used by state level planners and by community college administrators in solving the following three specific problem areas:

1. identification of manpower needs in selected occupations for which input data are available
2. providing data for minimizing gaps between the numbers of students entering selected occupational programs of the community college and the actual numbers that should be trained in those specific areas
3. making projections of manpower needs for student enrollment planning.

Delimitations

1. The study focused on four exemplary occupational programs offered by 68 selected community colleges in Florida, Virginia, and Maryland. Exemplary occupational program enrollments were specified by the selected institutions.

2. Community-based statistical information indicating areas of manpower needs was gathered from The Florida Statistical Abstracts, 1974, 1975 (Thompson, 1974;1975) and similar statistical reports from Virginia (Commonwealth of Virginia, 1974) and Maryland (State of Maryland, 1974).

3. Validity of the multiple regression equations was determined by the predictability factors using an alternate year's data from a single state (Florida) for input.

Limitations

Generalizations can be applied to other community college districts and other occupational programs from such a study only if the inputs of the manpower needs data and the structure and goals of the occupational programs are similar. Knowledge of factors unique to certain areas could play an important role in the final predictions of enrollments in the occupational programs. Changes that would have a major effect on population shift, population growth, and the emphasis in education should be seen as additional valid local inputs. Furthermore, national and state economic trends and political changes may also need to be considered as variables in the planning process.

Justification for the Study

The public education system exists to serve the society within which it operates. The programs it offers, and the type of education it gives to its students, should reflect the needs of that society. In the uncomplicated 19th century, there was little need for highly trained workers. Farming, low skill factory work, or apprenticeships were the choices for most of the population, and public education adequately filled the gap of meeting the needs of that society by providing a literate populace.

Unfortunately, many of the 19th century concepts were carried over into the 20th century. Schools still seemed to operate upon the premise that they need only provide a general education aimed at producing a literate populace. General education, though, was no longer enough for a now complicated society; for along with general education, the community needed varied and sophisticated occupational skills to be provided by the public education system.

The community colleges have taken major steps toward filling this gap. They have been providing at the community level a wide variety of specialized training that is needed (Wygal, 1975). But too often, these colleges have operated on past experience, intuition, or political influence in providing specific occupational programs and specifying the enrollments in those programs.

It is imperative that the community college administrators in the 1970's move from the subjective decision making for occupational program planning, with no assurance of data accuracy on community occupational needs, to planning occupational programs and the enrollments in those programs based on readily available, valid, community-based data. The severe budgetary restraints being placed on most public community colleges by state legislatures as well as local sponsors makes the prioritization of occupational programs and strict accountability for existing programs true necessities (Wygal, 1975).

Rarely, though, has enough information been readily available for administrators to move beyond intuition in decision making for occupational program planning. Prior to 1964 and the national assessment project, theoretical constructs for projecting enrollments and program planning were almost unknown phenomena. Though complementary to the model COMONAME, national assessment was much broader in scope and began with the basic premise that all educational needs and goals were already determined on a national basis. Thus, the project concentrated on the setting of standards by which students from across the country could be measured, but did not deal with local community needs for specific areas such as occupational programs (Education Commission of the States, 1972, p. xi-xxi).

Battelle Memorial Institute (1972) developed a questionnaire covering all aspects of the community college from management analysis to course requirements, and the Northern California Program Development Center in Chico (1973) followed a similar methodology, but with a more limited scope. While both of these needs assessment procedures established an important vehicle for feedback from the community, they did not provide the type of information that is needed for a constructive community-based educational needs assessment; they lacked specific subject matter and also lacked the feature of being updated on a regular basis.

The National Laboratory for Higher Education developed a model for the involvement of community groups in the process of assigning priority to educational goals at selected institutions (Baker & Brownell, 1971). However, the major constraints of this model were that it had predetermined the set of goals from which to choose, and it assumed that a maximum of 30 people represented a sufficient cross section of the community such that the consensus they reached would be valid and unbiased.

A consortium of seven community colleges in Florida proposed and undertook a study of community-based occupational needs assessment (Central Florida Community Colleges' Consortium, 1974). State employment service monthly job bank statistics were used as the data base from which area job needs by occupation were identified and projected for years ahead. Major criticisms of this project included the fact that much needed data were often inaccessible, and that the data base included only slightly better than one-third of the reported job openings in an area from which short and long term occupational needs projects were being made. Furthermore, the adoption of this model by other areas was dependent upon the development of centralized and rather sophisticated employment statistics reporting systems which few states boast (Educational Management Systems, 1975, p. 96).

The time has come for an economically feasible occupational needs assessment model which community college administrators and state level planners can employ in their program planning to help their institutions be more responsive to the trained manpower needs of their communities. The need is for a model that is based on readily available, valid, community-based manpower needs data. A model is needed that can be updated on a regular basis, and that incorporates ease of adoption by other educational institutions.

The model (COMONAME) was based on a theory that relates readily available community manpower needs data to present enrollments in exemplary occupational programs in community colleges in three states. The relationships were then validated at Florida community colleges offering similar programs. The model can now be used by state level education planners and by college program planners to predict appropriate enrollment figures in selected occupational programs to meet the manpower needs of their communities.

Education program planning in the occupational curricula of the community college with the use of COMONAME can be based on facts rather than on guesswork. The model can be revolutionary in bringing about positive change in the education of man in the 1970's. COMONAME can serve as a basis for the vehicle by which formal post-secondary education moves from its existing state to what it should be - serving the true needs of the people in the community.

Definition of Terms

COMONAME. An acronym for COMmunity-based Occupational Needs Assessment Model for Educational planning. This theoretical construct for educational program planning takes the form of a series of mathematical equations which relate selected community manpower needs data to selected exemplary community college occupational program enrollments. The model can be used as a basis for projecting appropriate occupational program enrollments at community colleges.

Community. The area so designated by the state (usually following the county boundaries) as that which is to be served by a particular community college.

Community-based educational needs assessment. The identification of educational training that will be needed to decrease gaps in a given community's trained manpower needs.

Community-based manpower needs statistics. Published statistical data which present: (1) numbers of persons employed in a given occupation by geographical area; and (2) indicators of specific occupational job needs within a geographical area.

Community-based occupational needs assessment. This refers to the identification of job areas in which there exist shortages or surpluses of manpower within a given community.

Community needs assessment. The quantified identification of shortages or surpluses found among services, facilities, resources, and manpower training within a given area.

Occupational education. At the community college, those programs which include courses of two years duration or less, combining the development of skills required for entry into a locally important occupation with related knowledge and theory calculated to help the student progress on the job (Thornton, 1972, p. 70).

Organization of the Remainder of the Research Report

The second chapter provides a review of related research, educational needs assessments in general, and also specific occupational needs assessment studies. A presentation of COMONAME and its components is the substance of information contained in the third chapter. Chapter IV provides an illustrative application and discussion of the COMONAME model in Florida, and the final chapter presents a summary of the study, along with conclusions and implications for further research.

CHAPTER II

NEEDS ASSESSMENT STUDIES FOR EDUCATION

A review of the related research on educational needs assessment studies shows that many and varied projects have been conducted (Educational Testing Service, 1973; Hawthorne, 1973; Marinelli, 1972; Wormer, 1973). The studies range in scope from national and statewide surveys to studies encompassing single purpose data for one institution or school district. Of all the assessment subject matter, the data gathering techniques, and the theoretical models proposed, few are similar.

Florida, Virginia, and Maryland stand out as pioneers in educational needs assessment. For the purpose of this review of related research, however, only a sampling of the educational needs assessment studies has been reported. Studies have been grouped into three categories and a section relating the research to the study follows. The categories are not restrictive, for oftentimes the educational needs assessments were broad in nature, but a major focus was identified for the reader's convenience. The categories reported are:

1. Goals setting and long-range planning assessments

2. Facilities design and educational innovation
3. Specific occupational needs assessment studies
4. Relationship of related research to the study.

Goals Setting and Long-Range Planning

A 1959 document addressed to the legislators and the citizens of the Commonwealth described the communities' needs and desire for Virginia to provide two-year colleges throughout the state. This document was the first in a series of publications which put forth recommendations for: (1) establishing the opening dates of the two-year colleges; (2) the anticipated enrollments at the institutions; (3) the scope and character of feasible programs; (4) the facilities needed; and (5) the financial ability of the community to help support the projected programs and facilities (State Council for Higher Education, 1959).

Virginia's first master plan was published in 1967 by the State Council of Higher Education and was intended as a 10-year guide for the coordination of post secondary education in the state. Though the early plan enumerated general direction, it had inadequate provision for the rapid expansion of the community college system, and thus a revised plan was needed. The Virginia Plan was published in 1974 through the combined efforts of the State Council with input from faculty, students, legislators and citizens. The intention of the planners was to update the plan every two years so that a basis for continuous planning could be accomplished. Three major goals (accessibility, excellence, and accountability), 11 subgoals and 41 future recommendations for higher education were discussed (State Council of Higher Education, 1974).

In Florida the Community College Council developed the long-range plan for expansion of the community colleges. This document which was the 1957 report to the State Board of Education put forth the following findings: (1) There is a great increase in the numbers of young people who will need facilities for continued education beyond high-school; (2) there is an increasing percentage of Florida's high school seniors who have indicated interest in many kinds of post high school education; (3) the public community colleges would help eliminate many of the barriers to continued education which now influence the decisions of high school seniors; (4) the local surveys reveal a great amount of local support for and interest in the development of community colleges with broad programs; and (5) the long-range plan of Florida would require the eventual establishment of 27 community colleges if the barriers to continued education are to be eliminated. Twelve specific recommendations were also stated in the report (Community College Council, 1957).

In a later report in Florida a published study defined six processes in the planning of the community colleges (Henderson, 1973). The first two of these processes related to needs assessment at the post-secondary education level: (1) assessment of the conditions and environment of the community college system as a whole, and (2) an assessment of the societal needs that the college should be responsible for considering. The purpose of these statements of commitment to educational needs assessment was to define the community colleges' goals and to use them as the basis of the master plan for long-range college developmental planning.

A 1972 document identified guidelines and provided the design for developing a master plan for community college education in Maryland. As such, the report identified the major components of a comprehensive master plan; and for each of the components (1) defined the problem and posed questions to be considered in developing the master plan;(2) reviewed the ways in which some states other than Maryland have approached the problem area; (3) noted the extent to which Maryland appears to have addressed itself to the problem; and (4) proposed strategies through which Maryland could proceed to resolve the problem as required for the formulation of its comprehensive master plan (Associated Consultants in Education, 1972, p. iii).

The statewide master plan for Maryland was developed in 1973 and has served as a guide for the development of the community colleges in the state. General population and demographic characteristics, the new community college students, faculty and administrators, instructional practices, governance, and financing were all considered in the preparation of the plan, making it a most comprehensive document (Maryland State Board for Community Colleges, 1973).

The Northern California Program Development Center in Chico (1973) considered a program to measure and rank community educational needs, setting goals and objectives based entirely on the opinions of a cross section of the community. Specific problem areas where long-range planning was focused included the development of programs and services to the many rural isolated children in the state.

Walter J. Foley (1972), as principal investigator of a Management Information System (MIS) project under an Office of Education grant, was interested in developing an MIS covering all aspects of the educational process. A specific area of interest in this system was entitled: "Missions and Goals Statements for Education." In it, Foley was concerned with developing a system that would be responsive to the informational needs of decision-makers in education. He recognized the need for the development and construction of a common data base and for making information gathering for educational institutions an on-going process.

Along similar lines, Huron, South Dakota has developed a computer simulation planning model called HELP for Higher Education Long-range Planning (Milne, 1972). The emphasis of this model was on determining philosophy and objectives, and because it was computerized, it could be easily adapted to most college planning situations. HELP might be used in the initial states of college development or when an existing institution needs to re-evaluate its goals.

Educational needs assessment in a Michigan study represented a part of a larger educational accountability model designed to aid the state elementary and secondary school system from goals setting to implementation and feedback (House, 1974). Significantly, it was the educational needs assessment portion which, in a 1974 evaluation of the model,was found to be wanting. It was considered by the evaluators that the goals of the assessment model were too narrow, and that testing every pupil which was the method being used by those involved in needs assessment, amounted to "overkill." It was recommended that in the future, a matrix sampling technique of selecting students be used and that each of the students be tested in only a few areas. While this would not provide accurate data on individual students or schools, it would provide data for the state as a whole. In addition, it would provide better economy in both cost and time.

The National Laboratory for Higher Education has developed a model for the involvement of community groups in prioritizing educational goals (Baker & Brownell, 1971). Goals setting for organizational accountability, a leadership strategy, emphasized face to face communication with up to 30 participants representing community and college. Its purpose was to reach a consensus on the rank of overall purpose goals, institutional ends goals, and management support goals.

A highly respected and widely used goal setting model, devised in conjunction with Phi Delta Kappa, forced individual and community involvement in the development and prioritization of educational goals (Commission of Educational Planning, 1972). Phase one of the package was concerned with the determining of needs and ranking of goals, while phase two concentrated on the translation of those needs into easily workable performance objectives.

Modeled after the national assessment for education, Minnesota's educational assessment took a systems' approach and incorporated a feature for periodic monitoring and re-evaluating the long-range goals (Pyecha, 1973). Broad goal setting and review procedures were also incorporated into a part of recent educational assessments in at least 10 states: Colorado, Maryland, Kentucky, North Carolina, Wisconsin, Arizona, North Dakota, Georgia, Arkansas, and Florida (Central Florida Community Colleges' Consortium, 1974 p. 49).

The educational needs assessment model followed by South Carolina's public school system consisted of the appointment of task forces. The development by these task forces of the educational needs assessment model, the identification, after-data collection and analysis of the State's most pressing educational needs, and, finally, a schematic presentation of an implementation procedure followed (Trull, 1973).

Stanford Research Institute (Dell, 1973) developed a full-scale model for educational planning and the establishment of institutional goals and objectives. This technique, termed "objective scaling procedure" (p. 28), used magnitude estimation scaling which is a systematic assessment of one's attitudes towards institutions and cultural phenomena. Provided with a listing of objectives for a given educational institution, administrators, citizens, and planners then applied Stanford's technique. Computer processing provided input which included objectives in prioritized lists.

At Brevard Community College (1973) in Florida, an institutional goals inventory was field tested during 1974. This model delineated a college's goals and established priorities among them. Though it did not tell colleges how to reach the goals desired, the goals inventory provided a means by which individuals and constituent groups could contribute to the goals establishing process. Each respondent was asked to assign a degree of importance to a series of statements given, and by goal/area discrepencies were highlighted.

Facilities Planning, Educational Innovation Studies

Sponsored by the Bureau of Higher Education's Division of College Support, in cooperation with the Appalachian Developing Institution's Consortium, a survey of high school juniors and seniors in areas served by members of the consortium was conducted (Rosler, 1972). The goals of this survey were: (1) to discover the kind of image each consortium institution had with students; and more directly related to educational needs assessment, (2) to obtain information on these students' backgrounds and educational plans to assist administrators in establishing productive communication to aid in recruitment and program planning; and (3) to increase the accuracy of enrollment predictions and estimates of space needs.

Students being asked to assess their own educational needs in various areas were cited as the basis for the success of two educational innovations reported. Learning activity packages (Walter, 1972, p. 38) were identified to be extremely effective as methods of individualized instruction in a wide variety of subject matters. The students who helped to plan their own learning goals and objectives retained significantly more material as they were able to work at their own pace. The student-centered college curriculum at Hiram College, as reported by Morgan (1972), showed that with the combination of increased freedom and interdisciplinary studies, the intellectual attitudes and academic achievement of students were higher than those students who studied traditional subjects with little freedom of choice. In another study reported by Bochman (1973), performance contracting as an innovative methodology had been designed to offer a unique opportunity to personalize and humanize education. Morale and attitude toward learning were especially positive in students exposed to this approach.

In higher education, Florida made a survey of the lower west coast to aid in facilities planning in both two-year and four-year institutions in Collier, Lee and Manatee counties (Florida State Board of Regents, 1973). Such problems as the lower west coast's distance from a public four-year institution and Edison Community College's extremely large service area were demonstrated. Proposals for additional facilities in the area were outlined. A similar survey, this time in New England, established the need for a college of veterinary medicine to be located in the five state region (New England Board of Higher Education, 1973).

Specific Occupational Needs Assessments

Several statewide occupational needs surveys have been undertaken with the rationale of establishing occupational needs of the participating states over the next several years; such studies were done in Kansas (Kansas State Master Planning Commission, 1971) and in Minnesota (Copa & Irvin, 1972). The Kansas survey projected manpower needs to 1985 and included the study of the relationship of job openings, education, experience, the role of women in the work force, occupational distribution, and job preparation requirements in specific terms. The Minnesota survey offered data by occupational area regarding job openings filled and unfilled in 1973.

Virginia's Department of Community Colleges undertook a massive follow-up study of former occupational-technical students at 720 community colleges throughout the nation. The purpose of this study was to evaluate the effectiveness of follow-up studies in measuring attainment of educational goals as stated in the community college literature. The findings could then be made specific to Virginia institutions. Twelve recommendations for follow-up study improvement resulted: (1) seek advice from outside consultants; (2) utilize published materials on planning studies; (3) include non-graduates in the research group; (4) employ representative sampling techniques; (5) set an acceptable response rate and implement means to achieve it; (6) limit questionnaire to information not obtainable from college records; (7) test for non-response bias; (8) distinguish between experienced workers and career entry workers; (9) conduct longitudinal studies to measure career advancement; (10) obtain employer evaluations; (11) provide descriptions of population and procedures; (12) relate the follow-up study results to educational goals (Williams, 1974).

A study sponsored by the Connecticut State Department of Education in cooperation with Manchester Community College was based on the assumption that new careers will open up in gerontology to meet the needs of a rapidly expanding population of older people. Occupational needs and educational interests of providers of personnel services to the elderly were surveyed. Dickstein (1972) also provided a companion survey of the needs and interests of the senior citizens living in Hartford, Connecticut.

In Florida, the first of a series of publications concerning the assessment of future manpower needs in human service occupations was issued in 1970 (Florida

State Manpower Planning Council, 1970a, 1970b, 1972, 1973, 1974). A similar study was conducted in Pennsylvania to guide community college administrators in the planning and the developing of short term programs in child care, fire prevention, and library and teacher aid (Kiffer, 1972). Florida also undertook a specific manpower and education study of criminal justice personnel which provided evidence of employer demand for personnel in this field and projected manpower needs over 10 years (Florida State University System, 1973).

The Okaloosa-Walton Junior College (Florida) district investigated the employment characteristics and the vocational training needs of its two county area over a period of three years (Durham, 1972). Employers in 683 businesses were interviewed as to their present and future manpower needs and from this survey manpower projections for the community to 1976 were made.

A consortium of seven community colleges in Florida proposed and undertook a study of community-based occupational needs assessment. State employment service monthly job bank statistics were used as the data base from which area job needs by occupation were identified and projected for years ahead (Central Florida Community Colleges' Consortium, 1974). Major criticisms of this project were its unwieldy nature, inaccessible data, high administrative and maintenance costs, and a data base which included only slightly better than one-third of the job openings in an area from which short and long term occupational needs projections were being made. Furthermore, the adoption of this model by other areas was dependent upon the development of centralized and rather sophisticated employment statistics reporting systems, which few states boast (Educational Management Systems, 1975, p. 96).

No doubt in recognition of the importance of understanding the occupational structure of the community, several manuals for conducting manpower surveys have been published. Two such studies discussed the steps which should be taken in constructing survey instruments, doing the actual survey, and the process by which research personnel can evaluate the data (Collins, 1972; Morton, 1972).

The U.S. Department of Labor published several manuals to provide national, regional, and local data. Contained within the instrument were projection techniques to allow planners in local areas to examine manpower conditions and make manpower projections.

The Manpower Administration of the U.S. Department of Labor has published reports on research and demonstration projects in its annual edition of Manpower Research and Development Projects (Manpower Administration, 1973). Projects discussed included programs for the use and development of manpower, special target groups, manpower program planning and administration, the labor market, and manpower economic and social policies.

Detailed statistics on the non-agricultural work force in the United States were presented in Employment and Earnings, 1909-1972, prepared by the U.S. Department of Labor (Bureau of Labor Statistics, 1973a). This publication included monthly and annual employment averages, average weekly and hourly wages, average weekly and overtime hours, job vacancies, and labor turnover rates. Included in this publication for the first time was historical information on job vacancies from 1969. Also included were seasonally adjusted data on short and long term job vacancy rates and long term job vacancies.

The Tomorrow's Manpower Needs series has been published by the Bureau of Labor Statistics in the U.S. Department of Labor for assisting those making state and area manpower projections, to evaluate educational needs and training needs, and to assist in vocational guidance (Bureau of Labor Statistics, 1969a, 1969b, 1969c, 1970a, 1970b, 1972, 1973c, 1973d, 1974b). It is assumed that consideration of national developments will make state and community area projections more reliable. Because the most recent and accurate manpower needs data should be available for use in making projections, there have been periodic revisions and refinements of all of these publications.

The Occupational Outlook Handbook (Bureau of Labor

Statistics, 1974a) was based on Bureau of Labor research in occupational and manpower trends. The Handbook provided information on over 800 occupations and 30 major industries. In addition to projecting future job opportunities, the Handbook gave job description, interest, and ability requirements; educational and training requirements; and salary and working conditions.

An historical series of tables, complete through 1972, was contained in the Bureau of Labor Statistics Handbook of Labor Statistics (Bureau of Labor Statistics, 1973b). These data included tabled information about labor force, employment and unemployment, hours, compensations, prices and living conditions, and union and industrial relations. In addition, data about industrial injuries and foreign labor statistics were included. In the 1973 edition, Tables 57 through 59 in the chapter on employment provided noteworthy historical information about manpower development and training in federal programs.

The Department of Labor has issued an annual report on manpower requirements, resources, utilization, and training, and the Department of Health, Education, and Welfare has issued reports on education and training under the Manpower Development and Training Act. Both of these reports were included in the 1974 Manpower Report to the President (U. S. Department of Labor, 1974).

Relationship of Related Research to the COMONAME Model

As this review of related research has shown, educational needs assessment studies have been growing in numbers due to local necessity and/or state and regional demands. The assessment studies conducted have focused on a variety of areas, although those reported were limited to institutional goals setting, projecting facilities needs, and planning educational programs in the occupational curricula. It should be emphasized again that Florida, Virginia, and Maryland have been in the forefront in their respective commitments to educational needs assessment.

A basis for all the studies was the underlying need for educational planners to classify, explain, and/or predict various events in the future. Various theoretical constructs and mathematical models were presented to attempt to meet those needs.

The COMONAME model was built on the scholarly research in the area of educational needs assessment, and proposed the building of a theoretical construct composed of a series of mathematical equations to aid educational program planners in the decision making process. A community-based occupational needs assessment model for educational planning was built, validated, and examples for use shown. Utilizing this model, occupational program and enrollment decisions by educators and state level planners may be based on valid, quantified, contemporary, community-based data rather than on past experience, pure conjecture, or political pressure from external sources.

CHAPTER III

RESEARCH DESIGN AND PROCEDURE

The study was designed to (1) determine the empirical relationship between selected community-based, quantified data and total student enrollment figures in selected occupational programs offered at community colleges in three states and with a relationship established, to (2) build a model for projecting appropriate occupational program enrollment figures for community colleges for future years. The predictor variables selected are specified below in the section Data Collection and represented factors that were available in the Statistical Abstracts 1974, 1975 for Florida, Virginia, and Maryland.

The enrollment figures represent the total student headcount in the following occupational programs: (1) nursing, all levels, (2) data processing, (3) secretarial sciences, and (4) business administration during the year 1973-1974 for all of the community colleges in Florida, Virginia, and Maryland. Florida enrollment figures and census data from the following year (1974-1975) were used to validate the prediction model.

The community variables were used as predictors in a regression analysis to determine their relationship to total program enrollment by college. The data analysis resulted in a linear combination of predictors for each of the four occupational program areas which had the highest correlation with the criterion variable. Equations were then written which will predict future student enrollments in those programs by using the community variables. Statistics to indicate the accuracy of the prediction equation were also obtained.

Procedures

The research study was conducted in the following four phases:

I. Identification of the statistical information sources.

II. Development of the COMONAME components from data derived in Phase I.

III. Validation of the model components.

IV. Illustrative application of COMONAME.

The procedures for handling each phase are briefly discussed in the paragraphs that follow:

Phase I. Information sources were identified on the basis of accessibility and validity. Community-based manpower needs statistics were extracted from the

Florida Statistical Abstracts, 1974-1975 and from similar reports for Maryland and Virginia. Exemplary occupational program enrollments for the academic years 1973-1974, 1974-1975 were designated by the selected community colleges.

Phase II. A series of multiple regression equations were generated empirically relating the community manpower needs data to the known enrollments in the selected exemplary occupational programs. Using secretarial science as an example of an exemplary occupational program, the equation generated by each of the selected institutions offering such a program was:

$$\hat{Y} = \alpha + B_1X_1 + B_2X_2 + B_3X_3 \ldots B_jX_j$$

# Secretarial
Science Students = CONSTANT + B_1 (physicians, dentists, lawyers)
enrolled + B_2 (wholesale & retail units) + B_3
(manufacturing units) + B_4 (construction units)
+ $\ldots B_jX_j$

Adjustment of the beta weights and variables was accomplished by examining the equations for similar programs at the other community colleges selected. A general equation for each occupational area studied was then derived.

Phase III. Validity of the general equations, one for each occupational area selected, was tested by examining the predictability factors for projecting known enrollments in exemplary occupational programs utilizing an alternate year's data.

Phase IV. An illustrative application utilizing COMONAME to project student enrollments for selected occupational programs for 1974-1975 at Florida community colleges was reported.

Description of Population

Three states with community colleges that were able to (1) provide the appropriate enrollment figures by program at the institutional level and (2) provide appropriate census data broken out at the county level were chosen for the study.

A total of 68 community colleges in three states were used in the data analysis. Broken down by state, 28 of the institutions were located in Florida, 23 in Virginia, and 17 in Maryland. (See Appendix A for a complete listing of community colleges and their locations.)

Table 1 indicates the numbers of programs by state that were included in the data analysis across the three states. As a whole, Florida's community colleges consistently offered the four selected occupational programs at 95% of the institutions. Maryland and

Virginia were not quite so all encompassing in each of the community college offerings. Across the three states, business courses and secretarial science courses were offered at the greatest number of institutions. Nursing and especially data processing courses were offered at fewer institutions in the three states.

Table 1 - Number of colleges offering occupational programs selected for study, 1973-1975.

Program	Florida	Virginia	Maryland	Total
Nursing	27	17	10	54
Secretarial	27	22	13	62
Business	26	23	16	65
Data Processing	27	9	13	49

In Table 2 are indicated the numbers of occupational programs in Florida's community colleges that were included in the two-year data analysis. One secretarial program was discontinued during the 1974-1975 academic year. Interestingly, one new nursing program was added and one dropped, keeping the same total during the 1974-1975 academic year.

Table 2 - Number of Florida colleges offering occupational programs selected for study in 1973-1974, 1974-1975.

Program	1973-1974	1974-1975
Nursing	27	27
Secretarial	28	27
Business	26	26
Data Processing	27	27

Table 3 indicates the means and standard deviations of the total 1973-1974 enrollment by program in Florida, Virginia, and Maryland community colleges. Business had the largest mean student enrollment with nursing following. Secretarial and data processing mean student enrollments were comparatively less.

Table 3 - Means and standard deviations of total student enrollment by selected occupational program 1973-1974 for Florida, Virginia, and Maryland community colleges.

Program	Mean	Standard Deviation
Nursing	256.87	341.08
Secretarial	114.74	116.37
Business	309.83	511.27
Data Processing	96.57	94.53

Table 4 indicates the means and standard deviations of the total student enrollment by program for Florida community colleges during the year 1974-1975. Miami-Dade Community College and Florida Junior College at Jacksonville, having extremely large student headcounts, consistently raised the mean student enrollment in the four occupational programs chosen for this study. In comparing Table 3 and Table 4 it is apparent that Florida was consistent with Virginia and Maryland with the business administration programs having the highest mean student enrollment, and data processing having the lowest mean student enrollment. The secretarial science programs in Florida showed the greatest contrast in mean student enrollment of programs in the other two states. Nursing programs in Florida were also larger on the average than those programs in Virginia and Maryland.

Table 4 - Means and standard deviations of total student enrollment by selected occupational program 1974-1975 for Florida community colleges.

Program	Mean	Standard Deviation
Nursing	362.67	437.87
Secretarial	179.11	229.12
Business	486.81	734.76
Data Processing	73.70	75.95

In summary, the data showed that in the three states of Florida, Virginia, and Maryland during 1973-1974 and also during the following year (1974-1975) in Florida the highest mean student enrollment and the greatest standard deviation were in business administration courses followed by nursing, secretarial, and, finally, data processing.

As well as having the greatest mean student enrollment in 1974-1975, business administration courses were offered by the greatest number of institutions in the three states, and secretarial programs were offered by most community colleges in Florida during 1973-1974. Data processing courses showed both the lowest mean student enrollment and were offered at the fewest institutions both in 1973-1974 in the three states, and in 1974-1975 in Florida's community colleges.

Collection of Data

Community data for the predictor variables were obtained from U. S. Census Statistical Abstracts 1974, 1975 for Florida, Virginia, and Maryland. From this data base predictors were examined and were chosen for each of the four occupational areas on the basis of theoretical relationship to that program area. In most instances sources of employment for the occupational area were used as potential predictors. Birth rate per 1000 and population estimates were also used.

Predictor data were collected by county and then adapted to comply to the geographical service areas of the community colleges. The predictors for each program were as follows:

Nursing Programs

Birth rate per 1000
Number of physicians, dentists
Number of hospital beds
Number of mental hospital admissions

Secretarial Science Programs

Number of physicians, dentists, lawyers
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Business Administration Programs

Population in 1000's 1974
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Data Processing Programs

Number of selected service employees
Number of wholesale and retail employees
Number of manufacturing employees
Number of construction employees

Analysis of Data

To analyze the data, use was made of a statistical technique known as multiple regression analysis. Regression analysis is commonly performed on sample data which the researcher is interested in generalizing to a population. This refers to testing statistical hypotheses about the population parameters and allowing the researcher to apply statistical inference procedures in determining confidence limits for estimates and in testing hypotheses (Kim, 1975, p. 334.). (For a more detailed explanation of multiple regression analysis the reader is referred to Appendix B.)

The statistical treatment employed was a multiple regression analysis using the Statistical Package for the Social Sciences computer program - SPSSH -available at the Northeast Regional Data Center of the University of Florida for use with the University's IBM system 370-165 computer. This particular program computes a "line of best fit." That is, the predictor variables are weighted and combined in such a way that the variance in the dependent variable is minimized. Also, evaluative information for the prediction model such as multiple R, R square, degrees of freedom, and F ratio is computed.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter is divided into four areas corresponding to the four community college occupational programs studied: secretarial science; business administration; data processing; nursing. Within each of the four occupational program areas are two subsections. Data collected for the three states - Florida, Virginia, and Maryland for 1973-1974 are discussed in Section A, and the prediction model for each occupational program area is presented. Section B illustrates the prediction model used at the local level in Florida, along with a presentation of actual and predicted enrollments and percentage difference for 1974-1975.

A. Enrollment Model for Secretarial Programs in Three States

The results of the regression analysis for secretarial programs using 1973-1974 student enrollments and values for predictors for the three states - Florida, Virginia, and Maryland - are shown in Table 5 and Table 6. Table 5 shows the zero order correlations among the variables included in the regression analysis.

TABLE 5

Zero order correlations between variables included in secretarial program regression analysis for 1973-1974 data for three states.

	A	B	C	D	E
Fall '73 enrollment (A)	1.00	0.68	0.67	0.82	0.05
physicians, dentists, lawyers (B)	0.68	1.00	0.89	0.82	0.62
wholesale, retail units (C)	0.67	0.89	1.00	0.90	0.54
manufacturing units (D)	0.82	0.82	0.90	1.00	0.24
construction units (E)	0.05	0.62	0.54	0.24	1.00

It can be observed from this table that program enrollment (Fall 1973) correlated highest with the number of manufacturing units (0.82). Two other variables, wholesale and retail units, and physicians, dentists, and lawyers were also highly correlated (0.67) and (0.68), respectively. The number of construction units within the community college service areas correlated an infinitesimal (0.05) amount with the Fall 1973 enrollment in secretarial science programs.

Table 6 shows the results of the regression analysis of these same data. Included are regression coefficients (B) for each predictor variable, the standard error of each B, the mean of each variable, and the constant α (Y intercept) of the regression equation. Program enrollment is the dependent variable and the remainder of the variables are predictors.

TABLE 6

Regression analysis of 1973-1974 secretarial program enrollments within Florida, Virginia, and Maryland community colleges. (N=62)

Multiple R	.86	Constant (α)	49.39
Degrees of Freedom	4, 57	F Ratio	41.37

Predictor Variables	B	Standard Error	Mean
physicians, dentists, lawyers	0.078	0.027	793
wholesale & retail units	-0.290	0.239	179
manufacturing units	3.432	1.141	27
construction units	-0.178	0.079	211

It can be observed that the regression model resulted in a multiple correlation (R) of .86. Applying the results to form a prediction equation for secretarial science program enrollment yields:

$$\hat{Y} = \alpha + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4$$

where: $\hat{Y}$ is the predicted enrollment
α is the constant
B_1, B_2, B_3, and B_4 are regression coefficients for X_1, X_2, X_3, and X_4 respectively.

Substituting values from Table 6 the prediction equation reads:

$$\hat{Y} = 49.39 + .078\ (793) - .290\ (179) + 3.34\ (27) - .178\ (211)$$

$$\hat{Y} = 114.7$$

B. Enrollment Model for Secretarial Programs in Florida

Table 7 shows the results of the model as applied to Florida's 27 community colleges secretarial program enrollments using 1974-1975 enrollment figures. Actual and predicted enrollment figures are shown, as well as the percentage difference between predicted enrollment and actual enrollment.

It may be observed from Table 7 that of the 27 community colleges reported in Florida, the predicted enrollments fall between a low of -34.48 and a high of 62.16 percentage difference. The mean percentage

TABLE 7

1974-1975 actual enrollment, predicted enrollment, and percentage difference for secretarial programs in Florida community colleges. (N=27)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Brevard	Not Reported	----	----
Broward	104	113	+ 8.65
Central Florida	109	115	+ 5.22
Chipola	27	42	+55.55
Daytona	128	113	-11.72
Edison	98	92	- 6.12
Florida Jr. College	127	204	+60.62
Florida Keys	37	60	+62.16
Gulf Coast	60	67	+11.66
Hillsborough	326	381	+16.87
Indian River	208	186	-10.57
Lake City	57	38	-33.33
Lake Sumter	64	58	- 9.38
Manatee	82	89	+ 8.53
Miami-Dade	1200	1531	+27.58
North Florida	304	285	- 6.25

TABLE 7 (continued)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Okaloosa-Walton	68	59	-13.23
Palm Beach	116	119	+ 2.58
Pasco-Hernando	70	49	-30.00
Pensacola	464	304	-34.48
Polk	171	160	- 6.43
St. Johns River	60	78	+30.00
St. Petersburg	270	370	+37.03
Santa Fe	148	238	+60.81
Seminole	28	35	+25.00
South Florida	16	21	+31.25
Tallahassee	103	131	+27.18
Valencia	296	347	+17.23

difference is +12.55. Overall, the percentage difference between actual and predicted student enrollment varies greatly when enrollment is small. Two examples of high percent difference are Florida Junior College at Jacksonville (+60.67) (an exception to the rule) and

Florida Keys Community College (+62.16). Based on the input census data to the COMONAME formula, this college might successfully expand the enrollment in the secretarial program to meet the present community needs for secretarial help. Lake City (-33.33) and Pensacola (-34.48) show the opposite extreme. Using the COMONAME formula, these latter colleges might decrease the enrollments in their secretarial programs and still be training an appropriate number of secretaries for the communities in the community colleges' service area.

A. Enrollment Model for Business Administration Programs in Three States

The results of the regression analysis for business administration programs using 1973-1974 student enrollments and values for predictors for the three states - Florida, Virginia, and Maryland - are shown in Table 8 and Table 9. Table 8 shows the zero-order correlations among the variables included in the regression analysis.

It can be observed from this table that program enrollment (Fall 1973) correlated highest with the number of manufacturing units (0.81). The 1974 population estimate (in 1000's) was also correlated by 0.66.

Table 9 shows the results of the regression analysis of these same data. Included are regression coefficients (B) for each predictor variable, the standard error of

TABLE 8

Zero order correlations between variables included in the business administration program regression analysis for 1973-1974 data for three states.

		A	B	C
Fall 1973 enrollment	(A)	1.00	0.66	0.81
population estimate 1974	(B)	0.66	1.00	0.74
manufacturing units	(C)	0.81	0.74	1.00

each B, the mean of the variables, and the constant α (Y intercept) of the regression equation. Program enrollment is the dependent variable and the remainder of the variables are predictors.

TABLE 9

Regression analysis of 1973-1974 business administration program enrollment within Florida, Virginia, and Maryland Community Colleges. (N=65)

Multiple R	.81	Constant (α)	-31.08
Degrees of Freedom	2,62	F Ratio	61.84

TABLE 9 (continued)

Predictor Variables	B	Standard Error	Mean
population estimate (1974)	0.238	0.192	288
manufacturing	10.914	1.687	25

It can be observed that the regression model resulted in a multiple correlation (R) of .81. Applying the results to form a prediction equation for business administration program enrollment yields:

$$\hat{Y} = \alpha + B_1X_1 + B_2X_2$$

where:

$\hat{Y}$ is predicted enrollment

α is the constant

B_1, B_2, are regression coefficients for

X_1, X_2 respectively.

Substituting values from Table 9 the prediction equation reads:

$$\hat{Y} = -31.08 + 0.238\ (288) + 10.914\ (25)$$

$$\hat{Y} = 310.31$$

B. Enrollment Model for Business Administration Programs in Florida

Table 10 shows the results of the model as applied to Florida's 26 community college business administration programs using 1974-1975 enrollment figures. Actual and predicted enrollment figures are presented, as well as the percentage difference between actual and predicted enrollment.

TABLE 10

1974-1975 actual enrollment, predicted enrollment, and percentage difference for business administration programs offered in Florida community colleges. (N=26)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Brevard	48	41	-14.58
Broward	133	107	-19.55
Central Florida	189	162	-14.29
Chipola	159	121	-23.90
Daytona	418	398	- 4.78
Edison	30	41	+36.66
Florida Jr. College	320	393	+22.81
Florida Keys	93	54	-41.93
Gulf Coast	197	181	- 8.12

TABLE 10 (continued)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Hillsborough	887	903	+ 1.80
Indian River	50	38	-24.00
Lake City	70	61	-12.85
Lake Sumter	118	103	-12.71
Manatee	251	209	-16.73
Miami-Dade	3659	3931	+ 7.43
North Florida	13	22	+69.23
Okaloosa-Walton	875	838	- 4.22
Palm Beach	740	692	- 6.48
Pasco-Hernando	26	39	+50.00
Pensacola	1017	1001	- 1.57
Polk	481	432	-10.18
St. Johns River	91	82	- 9.89
St. Petersburg	1116	1251	+12.09
Santa Fe	(not reported)	(207)	------
Seminole	548	503	- 8.21
South Florida	73	68	- 6.84
Tallahassee	(not reported)	(131)	------
Valencia	859	830	- 3.37

It may be observed from Table 10 that of the 26 community colleges reported in Florida, the percentage difference between the actual and the predicted enrollment fell between a low of -41.93 and a high of +69.23. The mean percent difference is -.94. Overall, the percentage difference between actual and predicted student enrollment varies greatly when the enrollment is small. Based on the input census data of the COMONAME formula, North Florida Community College might successfully more than double its business administration program to meet the present community needs. Pasco-Hernando Community College might also successfully double its business administration program enrollment. Florida Keys Community College, though, should seriously consider reducing the business administration program enrollment. Based on the COMONAME formula, the 1974 actual enrollment is almost twice what is indicated by the predicted enrollment (-41.93). Indian River Community College should also re-evaluate the business administration program enrollment, because this college, too, is possibly overtraining business administration graduates for the community college service area.

A. Enrollment Model for Data Processing Programs in Three States

The results of the regression analysis for data processing programs using 1973-1974 student enrollments and values for predictors for the three states - Florida, Virginia, and Maryland - are shown in Table 11 and Table 12. Table 11 shows the zero order correlations among variables in the regression analysis.

TABLE 11

. Zero order correlations between variables included in data processing program regression analysis for 1973-1974 data for three states.

	A	B	C	D	E
Fall 1973 enrollment (A)	1.00	0.59	0.69	0.62	0.59
selected services employees (B)	0.59	1.00	0.87	0.71	0.85
wholesale, retail employees (C)	0.67	0.87	1.00	0.80	0.79
manufacturing employees (D)	0.62	0.71	0.80	1.00	0.70
construction employees (E)	0.59	0.85	0.80	0.68	1.00

It can be observed from this table that program enrollment correlated highest with the number of wholesale and retail employees (0.67). Manufacturing employees correlated at (0.62), and both construction employees and selected services employees correlated with program enrollment at (0.59).

Table 12 shows the results of the regression analysis of these same data. The same format is followed in this section as was followed in the two preceeding sections. Included are regression coefficients (B) for each predictor variable, the standard error of each B, the mean of each variable, and the constant α (Y intercept) of the regression equation. Program enrollment is the dependent variable and the remainder of the variables are predictors.

TABLE 12

Regression analysis of 1973-1974 data processing program enrollment within Florida, Virginia, and Maryland community colleges. (N=49)

Multiple R	0.70	Constant	(α) 31.55
Degrees of Freedom	4,44	F Ratio	10.64

Predictor Variables	B	Standard Error	Mean
selected service employees	-0.001	0.001	9897
wholesale, retail employees	0.018	0.008	2508
manufacturing employees	0.007	0.008	1935
construction employees	0.017	0.022	843

It can be observed that the regression model resulted in a multiple correlation (R) of .70. Applying the results to form a prediction equation for data processing program enrollment yields:

$$\hat{Y} = \alpha\ B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4$$

where:

$\hat{Y}$ is the predicted enrollment for data processing

α is the constant

B_1, B_2, B_3, and B_4 are the regression coefficients for X_1, X_2, X_3, and X_4 respectively.

Substituting the values from Table 12 the prediction equation reads:

$$\hat{Y} = 31.55 - .001\ (9897) + .018\ (2508) + .007\ (1935) + .017\ (843)$$

$$\hat{Y} = 94.66$$

B. Enrollment Model for Data Processing Programs in Florida

Table 13 shows the results of the model as applied to Florida's 25 community college data processing program enrollments using 1974-1975 enrollment figures. Actual and predicted enrollment figures are presented, as well as the percentage difference between the actual and predicted enrollment figures.

TABLE 13

1974-1975 actual enrollment, predicted enrollment, and percentage difference for data processing programs in Florida community colleges. (N=25)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Brevard	11	14	+27.27
Broward	33	42	+27.27
Central Florida	113	129	+14.16
Chipola	9	15	+66.66
Daytona	103	95	- 9.71
Edison	60	61	+ 1.67
Florida Jr. College	179	205	+14.53
Florida Keys	19	21	+10.53
Gulf Coast	47	46	- 2.13
Hillsborough	153	149	- 2.61
Indian River	58	67	+15.52
Lake City	23	28	+21.73
Lake Sumter	(not reported)	(28)	------
Manatee	63	60	+21.74
Miami-Dade	363	492	+35.54

TABLE 13 (continued)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
North Florida	16	22	+37.50
Okaloosa-Walton	767	62	- 7.46
Palm Beach	48	59	+22.91
Pasco-Hernando	10	15	+50.00
Pensacola	(not reported)	(37)	------
Polk	72	78	+ 8.33
St. Johns River	15	20	+33.33
St. Petersburg	132	149	+12.88
Santa Fe	110	98	-10.91
Seminole	44	52	+18.18
South Florida	(not reported)	(18)	------
Tallahassee	82	94	+14.63
Valencia	140	128	- 8.57

It may be observed from Table 13 that of the 25 community colleges reported in Florida, the percentage difference between the actual and the predicted enrollments for data processing programs falls between a low of -10.91 and a high of +66.66. The mean percent difference is +16.97. Overall, the percentage difference between actual and predicted student enrollment varies greatly when enrollment is small. Based on the input census data of the COMONAME model, Chipola Community College (+66.66) and Pasco-Hernando Community College (+50.00) might successfully expand the enrollment in the data processing program to meet present community needs. Daytona Beach Community College (-9.71) and Santa Fe Community College (-10.91) should examine closely the present enrollments in data processing, because, these schools may need to make enrollment reductions. It should be noted, though, that the presence of the University of Florida in the Santa Fe service area complicates this institution's projections, and the high actual enrollment may be meeting the community needs. Further refinement of the model would take such powerful influences into consideration.

A. Enrollment Model for Nursing Programs in Three States

The results of the regression analysis for nursing programs using 1973-1974 student enrollment and values for predictors for the three states - Florida, Virginia, and Maryland - are shown in Table 14 and Table 15. Table 14 shows the zero order correlations among the variables included in the regression analysis.

TABLE 14

Zero order correlations between variables included in nursing program regression analysis for 1973-1974 data for three states.

.		A	B
Fall 1974 enrollment	(A)	1.00	-0.08
physicians, dentists	(B)	0.75	1.00

It can be observed from this table that program enrollment correlated (.75) with the number of physicians and dentists in the communities involved. No other proposed predictor correlated significantly to be used as part of the model for predicting nursing program enrollment.

Table 15 shows the results of the regression analysis of these same data. Included are regression coefficients (B) for the predictor variable, the standard error, the mean, and the constant (Y intercept) for the regression equation. Program enrollment is the dependent variable.

TABLE 15

Regression analysis of 1973-1974 nursing program enrollment within Florida, Virginia, and Maryland community colleges. (N=54)

Multiple R	.75	Constant (α)	64.71
Degrees of Freedom	1,52	F Ratio	65.92

Predictor Variable	B	Standard error	Mean
physicians, dentists	3.436	0.423	55.93

The regression model resulted in a multiple correlation (R) of .75. Applying the results to form a prediction equation for nursing program enrollment yields:

$$\hat{Y} = \alpha + B_1X_1$$

where:

$\hat{Y}$ is the predicted enrollment for (data processing)

α is the constant

B_1 is the regression coefficient for X_1.

Substituting the values from Table 15 the prediction equation yields:

$$\hat{Y} = 64.71 + 3.436\ (55.93)$$

$$\hat{Y} = 256.88.$$

B. Enrollment Model for Nursing Programs in Florida

Table 16 shows the results of the model as applied to Florida's 25 community college nursing program enrollments using 1974-1975 enrollment figures. Actual and predicted enrollment figures are presented, as well as the percentage difference between the actual and predicted enrollment figures.

TABLE 16

1974-1975 actual enrollment, predicted enrollment, and percentage difference for nursing programs in Florida community colleges. (N=25)

College	1974-1975 actual enrollment (pt+ft)	1974-1975 predicted enrollment (pt+ft)	percentage difference
Brevard	281	302	+ 7.47
Broward	367	398	+30.39
Central Florida	102	82	-19.61
Chipola	15	25	+66.67
Daytona	229	321	+40.17
Edison	348	308	-11.49

TABLE 16 (continued)

College	1974-1975 actual enrollment (pt+Ft)	1974-1975 predicted enrollment (pt+Ft)	percentage difference
Florida Jr. College	739	692	- 6.36
Florida Keys	149	181	+21.48
Gulf Coast	160	108	-32.50
Hillsborough	280	239	-14.64
Indian River	153	189	+23.52
Lake City	67	81	+20.89
Lake Sumter	24	32	+33.33
Manatee	461	506	+ 9.76
Miami-Dade	2114	2368	+12.01
North Florida	12	19	+58.33
Okaloosa-Walton	---	---	------
Palm Beach	656	586	-10.67
Pasco-Hernando	---	---	------
Pensacola	633	652	+ 3.00
Polk	810	738	- 9.55
St. Johns River	---	---	------
St. Petersburg	754	802	+ 6.37
Santa Fe	436	455	+ 4.36

TABLE 16 (continued)

College	1974-1975 actual enrollment (pt+ft)	1974-1975 predicted enrollment (pt+ft)	percentage difference
Seminole	77	91	+18.18
South Florida	49	62	+26.53
Tallahassee	195	240	+23.08
Valencia	681	706	+ 3.67

Table 16 shows that in the 25 community colleges in Florida offering nursing programs, the actual versus predicted enrollment falls between a low of -32.50 and a high of +66.67 percentage difference. The mean percent difference is +13.84. Overall, the percentage difference between actual and predicted student enrollment varied greatly only when enrollment was small. Two examples of high percentage difference between actual and predicted enrollment in nursing programs are Chipola Junior College (+66.67) and North Florida Community College (+58.33). Based on the input data of the COMONAME model, these colleges should re-evaluate the present nursing program enrollment and consider possible expansion. Gulf Coast Community College (-32.50) and Central Florida Community College (-19.61) show low percentage differences between actual and predicted nursing program enrollments. These latter two colleges, based on the COMONAME model, should examine the enrollment for appropriate numbers of students. It is apparent that more nurses are being trained than the immediate service area can absorb. A follow-up study to examine the geographic placement of the nursing graduates would be helpful to the program planners in deciding whether it'is necessary to scale down the present nursing program enrollment.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study was an inquiry into a problem of widespread concern in higher education, that of providing appropriate occupational programs and enrolling appropriate numbers of students in those programs to meet the unique needs of the communities involved.

More specifically, a COMmunity-based Occupational Needs Assessment Model for Educational planning (COMONAME) was built, validated, and examples for use shown. This model may now be used by state level planners and by community college administrators in solving the following three specific problem areas:

1. identification of manpower needs in selected occupations for which input data are provided
2. providing data for minimizing the gap between the numbers of students entering selected occupational programs at the community college and the actual numbers that should be trained in that specific area

3. making projections of manpower needs for student enrollment planning.

Data representing 68 community colleges in Florida, Virginia, and Maryland were used in the data analysis. (See Appendix A for a complete listing of community colleges and their locations.) At these institutions the four occupational programs were: secretarial science, business administration, data processing, and nursing. Community data for the predictor variables were obtained from the U.S. Census Statistical Abstracts, 1974, 1975 and from these data, predictors were examined and chosen for each of the four occupational areas. Predictor data were collected by county and summed by geographical service area of the community colleges. The predictors considered for each program were as follows:

Secretarial Science programs

Number of physicians, dentists, lawyers
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Business Administration programs

Population in 1000's (1974)
Number of wholesale and retail units
Number of manufacturing units
Number of construction units

Data Processing programs

Number of selected service employees
Number of wholesale and retail employees
Number of manufacturing employees
Number of construction employees

Nursing Programs

Birth rate per 1000
Number of physicians, dentists
Number of hospital beds
Number of mental hospital admissions

The predictors were related to enrollment by use of multiple regression analysis. (For a more detailed explanation of multiple regression see Appendix B.) For each occupational area a general model was built using the three states' data for 1973-1974. These models were then validated by using new data (1974-1975 for Florida community colleges). Actual and predicted enrollments by program and institution in Florida were compared by computing the percentage differences.

The secretarial science program general model was built using the three states' data for 1973-1974. Of the four predictors considered, all four were included resulting in a multiple correlation (R) of .86 (significant beyond the .01 level). The model was validated by using new data (1974-1975 for Florida community colleges), and then actual and predicted enrollments by program and institution were compared by computing the percentage difference. These percentage differences ranged between 2.58% and 62.16%. In most cases the percentage difference between actual and predicted enrollment varied only slightly when actual headcount was large. Florida Junior College at Jacksonville

(60.18%) proved to be an exception to this rule. The presence of the many institutions of higher learning in Jacksonville and the University of Florida's location in Gainesville added a unique factor complicating the prediction process. These institutions would provide the areas mentioned with great numbers of persons willing to accept secretarial positions, though not specifically trained for these jobs. Further refinement of the COMONAME model should take such a specialized factor into consideration, and thus prevent program planners from glutting the market with a specific skill. Overall, though, the mean percentage difference for secretarial programs was a small 12.55%, which still provided a useful model for program planning in this area.

The business administration program general model was built using three states' data for 1973-1974, and of the four predictor variables considered, two were used (1974 population and the number of manufacturing units) resulting in a multiple correlation (R) of .81 (significant beyond the .01 level. The model was validated by using new data (1974-1975 for Florida community colleges) and actual and predicted enrollment by program and institution in Florida were compared by computing the percentage differences. These percentage differences ranged between 1.80% and 69.23%. Overall, the percentage difference between actual and predicted enrollment varied only slightly when enrollments were large. North Florida Junior College (69.23%) and Pasco-Hernando Community College (50.00%), though, showed actual headcount differences of only 9 and 13 students respectively. The mean percentage difference for business administration programs was quite small (.94%), thus clearly establishing the usefulness of the COMONAME model for program planning in this area at the community college.

The third general model built was for data processing programs using the three states' data for 1973-1974. All four of the predictor variables considered were used, resulting in a multiple correlation (R) of .70 (significant beyond the .01 level). This model was validated by using new data (1974-1975 for Florida community colleges) and actual and predicted enrollments by program and institution were compared by computing the percentage difference. The percentage differences ranged from 1.67% to 66.67%. Again, the percentage difference between actual and predicted student enrollments, overall, varied only slightly when headcount was large. Chipola Junior College (66.67%) and North Florida Junior College (37.50%), though, showed actual headcount differences of only six students. Pasco-Hernando Community College (50.00%) showed a headcount difference of only five students. The mean percentage difference for actual and predicted enrollments in data processing programs in Florida was quite small, at 16.97%. This clearly established the model's usefulness in program planning in this occupational area.

The community college nursing program general model was the fourth model built using the three states' data for 1973-1974. Of the four predictor variables considered only one (the number of physicians and dentists) was used, resulting in a multiple correlation (R) of .75 (significant beyond the .01 level). The model was validated by using new data (1974-1975 for Florida community colleges), and actual and predicted enrollments by program and institution in Florida were compared by computing the percentage difference. These percentage differences ranged from 3.00% to 66.67%. Again, in most cases, the percentage difference between actual and predicted student enrollment varied only slightly when headcount was large. The mean percentage difference for nursing was only 13.84%, providing a useful model for program planning at the community college level.

As this study has shown, the models for each specific program area require different sets of predictor variables. Further study would identify new predictors and develop a model for each program to be offered at the community college, resulting in an overall comprehensive planning model.

Implications for Further Research

The usefulness of the COMONAME model for occupational program planning in four specific areas at the community college level has been set forth in this study. Additional research is needed to expand the general set of equations to include additional program offerings in both occupational and university parallel areas. Indeed, a set of equations for all program offerings would seem most appropriate to further aid community college planners in minimizing the gap between the numbers of students entering specific areas and the actual numbers of students that should be trained in those specific areas. Predictor variables need to be identified and validated for the new areas so that the new equations may be put to use.

Greater accuracy of the COMONAME model will come with its continued widespread usage, and with the inclusion of specific local variables into the planning process. At the present time, further refinement is needed when program enrollments are small, and when the presence of an institution of higher learning creates a local surplus of broadly trained manpower. Further refinement of the model's components should include additional and possibly more reliable criteria for predictors. The factors might be the actual numbers of people employed in a specific area for which they were trained (and their salaries). The possibilities for expansion and refinement of the COMONAME model are great, and it is imperative that further research into this area of sophisticated program planning be continued.

APPENDICES

APPENDIX A

COMMUNITY COLLEGES INCLUDED IN THE STUDY

FLORIDA

Brevard Community College
Broward Community College
Central Florida Community College
Chipola Junior College
Daytona Beach Community College
Edison Community College
Florida Junior College at Jacksonville
Florida Keys Community College
Gulf Coast Community College
Hillsborough Community College
Indian River Community College
Lake City Community College
Lake Sumter Community College
Manatee Junior College
Miami-Dade Community College
North Florida Community College
Okaloosa-Walton Junior College
Palm Beach Junior College
Pasco-Hernando Community College

Pensacola Junior College

Polk Community College

St. Johns River Junior College

St. Petersburg Junior College

Seminole Junior College

South Florida Junior College

Tallahassee Community College

Valencia Community College

MARYLAND

Allegany Community College

Anne Arundel Community College

Catonsville Community College

Cecil Community College

Charles Community College

Chesapeake Community College

Community College of Baltimore

Dundalk Community College

Essex Community College

Frederick Community College

Garrett Community College

Hagerstown Junior College

Harford Community College

Howard Community College

Montgomery Community College (Rockville Campus)

Montgomery Community College (Takoma Park Campus)

Prince George's Community College

VIRGINIA

Blue Ridge Community College

Central Virginia Community College

Dabney S. Lancaster Community College

Danville Community College

Eastern Shore Community College

Germanna Community College

J. Sargeant Reynolds Community College

John Tyler Community College

Lord Fairfax Community College

Mountain Empire Community College

New River Community College

Northern Virginia Community College

Patrick Henry Community College

Paul D. Camp Community College

Piedmont Virginia Community College

Rappahannock Community College

Southside Virginia Community College

Southwest Virginia Community College

Thomas Nelson Community College

Tidewater Community College

Virginia Highlands Community College
Virginia Western Community College
Wytheville Community College

APPENDIX B

EXPLANATION OF MULTIPLE REGRESSION ANALYSIS

The following is based on Fox (1969):

The process whereby one seeks to predict performance on a single criterion variable from the knowledge of several predictor variables is called multiple regression. The process begins exactly as simple regression in that data are required for one group of respondents, for the criterion, and for all predictors. Two problems must be resolved, though, through the computational process of multiple regression. First, some of the predictors may be serving essentially the same functions and so all may not be necessary. This would be true if the predictors are so highly correlated together that there is no better predictive ability when using both, than when using only one of them. Therefore, the first step in multiple regression is to determine the most effective combination of predictors. What is sought is a set of predictors, each of which is related to the criterion, but which bear low relationships to each other.

The second problem is that the predictors included in this best possible combination undoubtedly differ in their predictive efficiency: some are better than others. Therefore, the computational processes are also directed toward determining a separate regression weight for each predictor so that one achieves the best possible prediction. This process involves great amounts of computation, and prior to the general availability of computers, the process was seldomly used in research for more than two predictors. Now computer programs are available (e.g.,SPSS) for solving the problems of multiple regression for larger numbers of predictors, and the technique is easily incorporated into the researcher's repertoire.

If one has gone through the multiple regression procedure and determined the best combination of predictors and the weights to be used with each, a method to evaluate the success of the prediction would be to correlate the predicted degree with the actual degree. The resulting multiple regression coefficient is the correlation between two sets of data: the actual sets of scores and the predicted set of scores. The mathematical formula is such that the squared deviation is such that the difference between the predicted and the actual variables is minimized in "n" dimensional space.

The general multiple regression equation is presented below:

$$\hat{Y} = \alpha + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 \ldots B_jX_j$$

where: $\hat{Y}$ is the prediction

α is the constant

B_1, B_2, B_3, and B_4 are regression coefficients for

X_1, X_2, X_3, and X_4 respectively.

Further explanation of multiple regression analysis and examples for practical application may be found in Harnett (1975), Morrison (1967), and Draper and Smith (1966).

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BIOGRAPHICAL SKETCH

James Russell Rowell, Jr. was born in Beverly, Massachusetts, where he attended public schools. He received a diploma from the Belmont Hill School in 1967, graduated from Rutgers College with an A.B. degree in English in 1971, and earned an M.A. degree in English and psychology from Tufts University in 1972. While at Tufts he taught freshman English and also served as a graduate researcher for the Department of Education.

In January, 1974 he was accepted for advanced graduate study at the Institute of Higher Education, University of Florida. His work experience included serving as assistant to the director of Central Florida Community Colleges' Consortium - Needs Assessment Project, as a graduate researcher for the Florida Community/Junior College Inter-Institutional Research Council (IRC), and as an instructor of a graduate level computers and systems course in educational administration at the University of Florida.

He is a member of Phi Delta Kappa, The American Association of University Professors, The American Association of Higher Education, and The American Educational Research Association. He is married to the former Janis Schocklin of Clearwater, Florida.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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